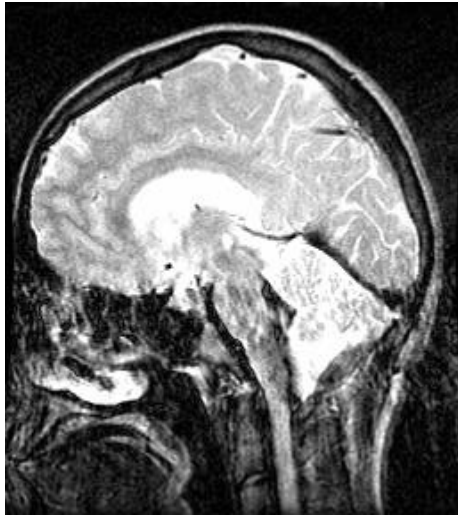


1) The following are MRI of the Brain – Sagittal. The value of TE and TR are indicated below each figure.



(A)

$T_E = 100 \text{ ms}$
 $T_R = 1500 \text{ ms}$



(B)

$T_E = 14 \text{ ms}$
 $T_R = 400 \text{ ms}$



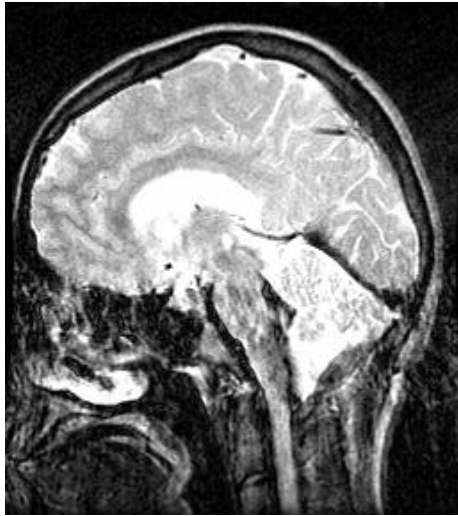
(C)

$T_E = 14 \text{ ms}$
 $T_R = 1500 \text{ ms}$

Image A is

- a) T1 weighted image
- b) T2 weighted image
- c) Proton density weighted image

2) The following are MRI of the Brain – Sagittal. The value of TE and TR are indicated below each figure.



(A)

$T_E = 100 \text{ ms}$
 $T_R = 1500 \text{ ms}$



(B)

$T_E = 14 \text{ ms}$
 $T_R = 400 \text{ ms}$



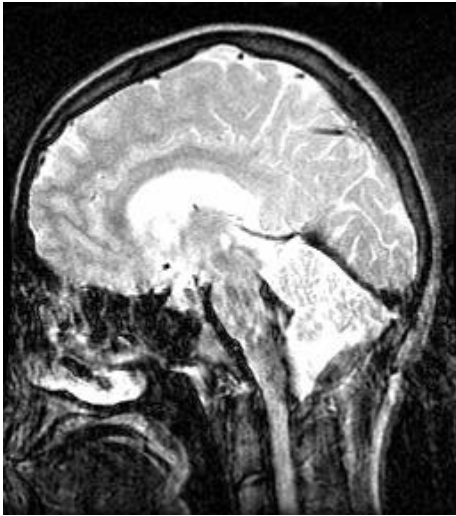
(C)

$T_E = 14 \text{ ms}$
 $T_R = 1500 \text{ ms}$

Image B is

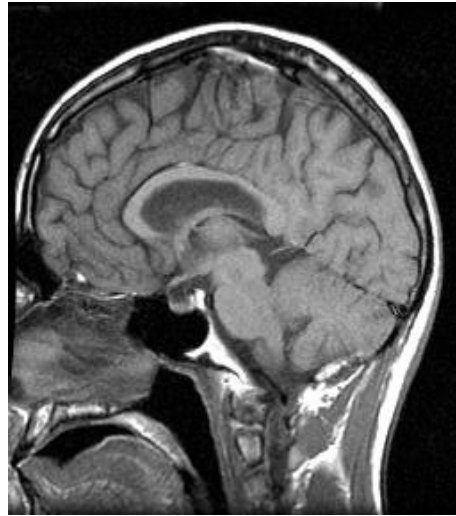
- a) T1 weighted image
- b) T2 weighted image
- c) Proton density weighted image

3) The following are MRI of the Brain – Sagittal. The value of TE and TR are indicated below each figure.



(A)

$T_E = 100 \text{ ms}$
 $T_R = 1500 \text{ ms}$



(B)

$T_E = 14 \text{ ms}$
 $T_R = 400 \text{ ms}$



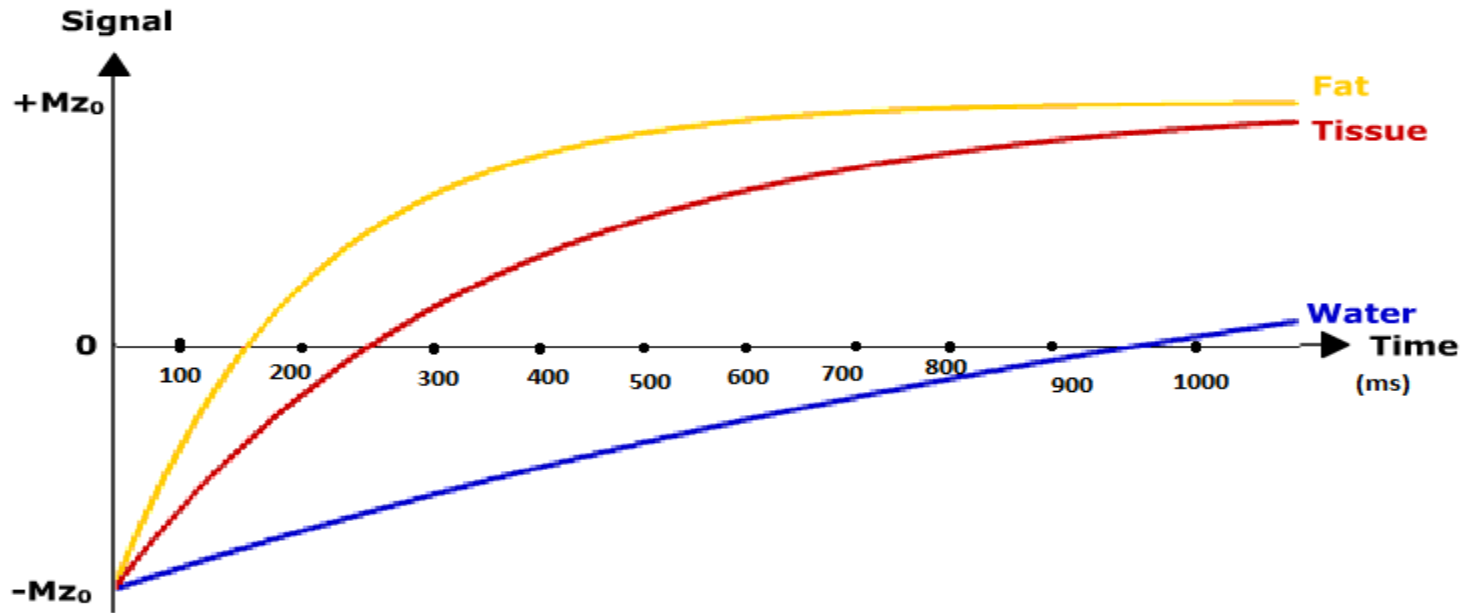
(C)

$T_E = 14 \text{ ms}$
 $T_R = 1500 \text{ ms}$

Image C is

- a) T1 weighted image
- b) T2 weighted image
- c) Proton density weighted image

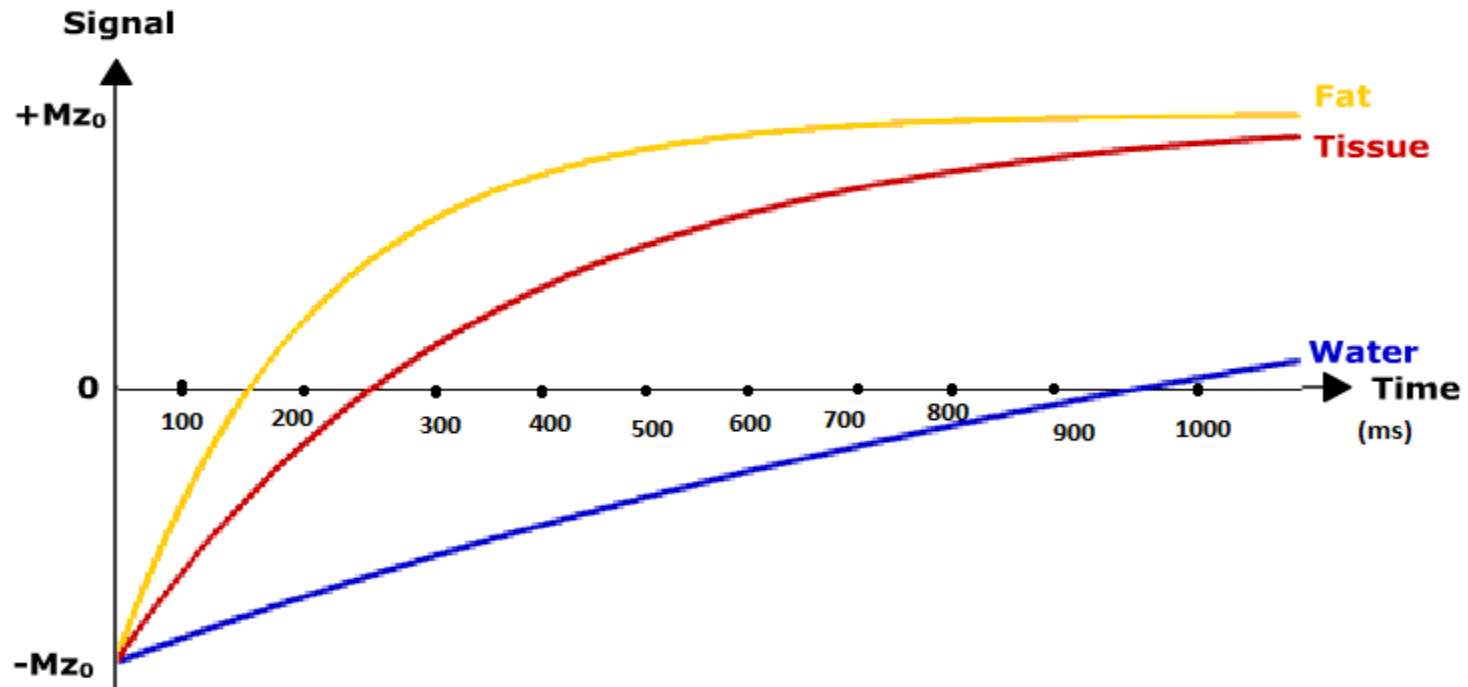
4) In inversion recovery sequence, choose the correct value of TI in each of the following cases by using the given graphs.



Getting STIR where, fat is suppressed at TI equal.

- a) 150 ms
- b) 250 ms
- c) 950 ms

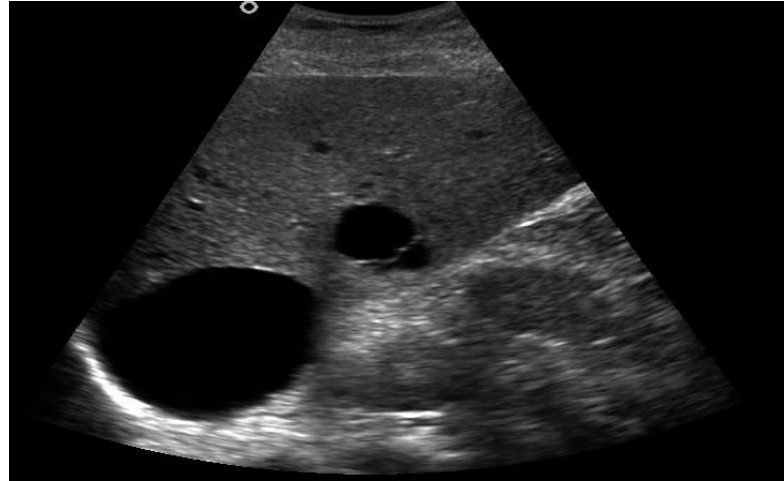
5) In inversion recovery sequence, choose the correct value of TI in each of the following cases by using the given graphs.



Getting FLAIR where, water is suppressed.

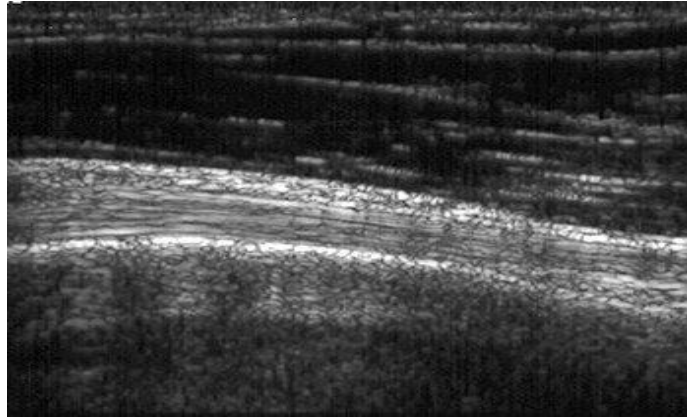
- a) 150 ms
- b) 250 ms
- c) 950 ms

6) The black dots shown in the figure may explained as:



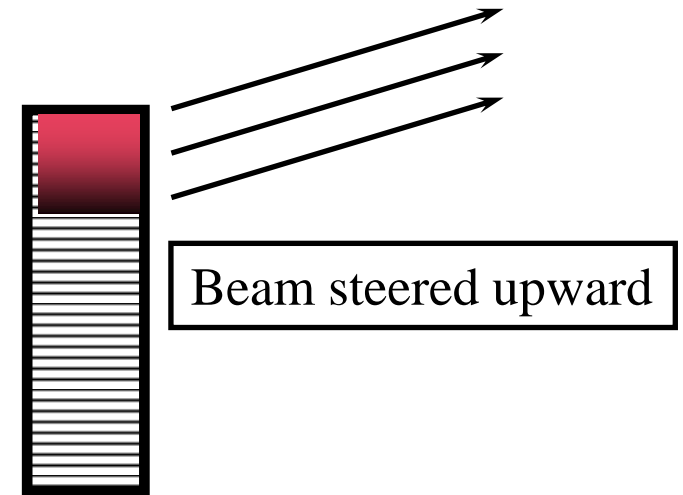
- A. No reflections occurred and this region may refer to bone.
- B. No reflections occurred and this region may refer to fluid within a cyst.
- C. Strong reflections occurred and this region may refer to bone.
- D. Strong Reflections occurred and this region may refer to blood flow.

7) The white region shown in the figure may explained as:



- A. No reflections occurred and this region may refer to bone.
- B. No reflections occurred and this region may refer to fluid within a cyst.
- C. Strong reflections occurred and this region may refer to bone.
- D. Strong Reflections occurred and this region may refer to blood flow.

8) In case of linear Phased Array transducer beam can be steered upward as shown in the figure if



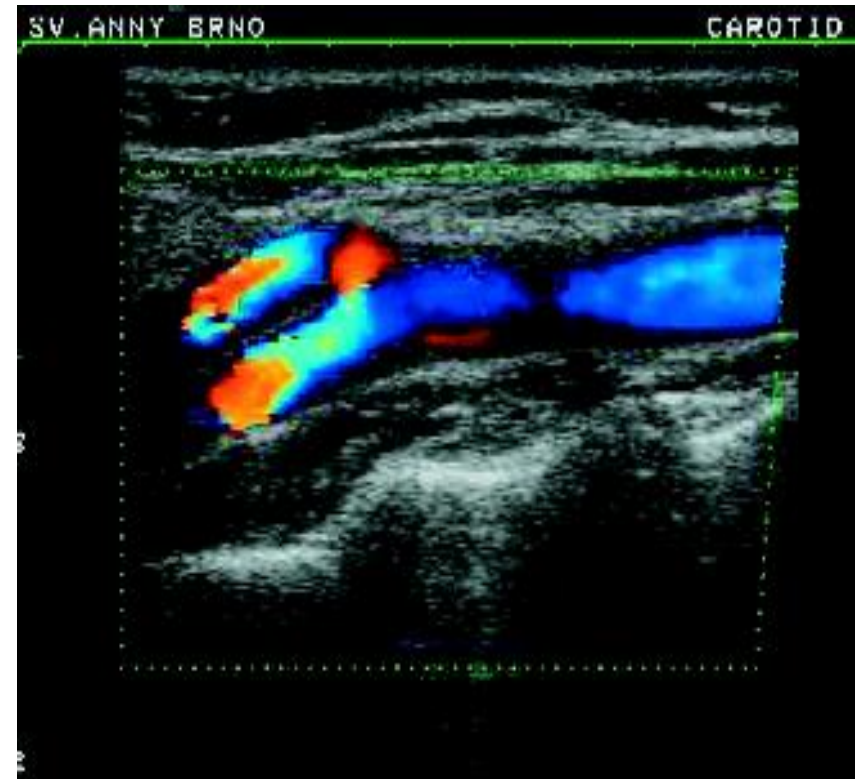
- A) activating bottom element first & top last
- B) activating top element first & bottom last
- C) activating top & bottom elements earlier than center ones

9) In DUPLEX method (Colour Doppler imaging) as indicated in the figure. The Blue color region means:

A. the fluid is
moving away
from the probe

B. the fluid is
moving toward
the probe

C. turbulences



10) What does PRECESSION mean?

- A. The spinning of Hydrogen protons around their own axis.
- B. Change in orientation of Hydrogen molecules when exposed to radiowaves at the Larmor frequency.
- C. The wobble of Hydrogen protons exposed to a large magnetic field.
- D. Water molecules gain an extra molecule of Hydrogen when exposed to a magnetic field

11) For most biological tissues, T2 is:

A. More than 100 milliseconds

B. Less than T1

C. More than T1

D. Less than T2*

12) Which would not be useful for medical MR imaging?

A. ^{13}C

B. ^{23}Na

C. ^1H

D. ^{16}O

13) A paramagnetic substance - Gadolinium, is used as an MR contrast medium because, it can make change of the signal intensity by

- A. Shortening T1 and T2 in its surroundings
- B. Increasing T1 and shortening T2 in its surroundings
- C. Shortening T1 and increasing T2 in its surroundings
- D. Increasing T1 and T2 in its surroundings

14) The Q factor of a transducer refers to:

- A. Coupling efficiency
- B. Transducer dead time
- C. Maximum intensity
- D. Minimum intensity
- E. Purity of the frequency

15) Reflections occur from all of the following except:

- A. Bladder wall
- B. Bladder contents
- C. Fat-kidney interfaces
- D. Kidney interior
- E. Smooth surfaces

16) Acoustic impedance (Z) is primarily dependent on tissue:

A. Density

B. Attenuation

C. Temperature

D. Atomic number

E. Oxygenation

17) Higher-frequency transducers have increased:

- A. Velocity
- B. Intensity
- C. Wavelength
- D. Attenuation
- E. Thickness

18) What fraction of ultrasound is reflected from a liver ($Z = 1.55$) and soft tissue ($Z = 1.65$) interface?

A. $1/2$

B. $1/10$

C. $1/100$

D. $1/1000$

19) Choice of frequency in ultrasound is most likely a trade off between patient penetration and:

A. Lateral resolution

B. PRF

C. Contrast

D. Noise

E. Axial resolution

20) Doppler shift from a moving object depends on all of the following except:

A. Frequency

B. Speed of ultrasound beam.

C. Object depth

D. Object speed

E. Angle between beam and object